on several counts. First, when a wetland community is destroyed, a few token plants from that site do not represent a viable form of damage control. A population of plants at a site consists of many individuals, each genetically distinct from the others. It is this seething mass of genetic diversity which enables plant populations to evolve over time; a few individuals extracted from a habitat do not possess this diversity. Furthermore, plants taken from the wild are usually ones deemed interesting by the collector. A plant hunter stumbling through a Savannah filled with green *S. flava* who finds a single plant with pitcher lids a lovely copper colour is going to dig up that plant—the very one most unrepresentative of the genetics of that population! Plant collecting is not an effective or even marginal form of conservation; if you want to save a bog you must save the bog itself, not just a few token plants. Very few individuals have the resources needed to grow a complete population of plants from each location and that is what would be necessary for this scheme to work. So really CLODS who claim to have conservation agenda are either misinformed or unwilling to face the reality of their collector's mentality. And consider this many times while admiring other growers' lists or collections, I have observed plants with location-information which unambiguously identifies that the plants have come from places protected by National Park status or affiliations with The Nature Conservancy. How does the conservation alibi explain the illegal collection of these plants? This explanation CLODS use simply does not hold water, so we are left with the previous three possibilities.

I have nothing against CLODS. My best friends are CLODS, I am one myself. But let us be realistic. If you have the mania then relish it for what it is—a simple obsession to collect, collect, collect. Adding a locafion-information tag as a new parameter gives you a reason to have a new item in your plant inventory—six different variants of *S. oreophila* are more fun than just one. Perhaps having a larger collection enhances your status among other growers, perhaps it makes you feel proud. Perfectly fine motivations. But please, I am tired of the worn old story that you have a valid conservation agendum—that CLODS are acting upon sincere and valid concerns for the plants. Are you interested in protecting these plants and wetlands? Write your politicians, donate time or money to conservation groups, be an activist. But if you have the compulsion, do not package it in green wrapping: no one is fooled and it is irritating in its duplicity.

The use of Tannic Teas in Carnivorous Plant Culture

by

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I must admit, when I first heard about the use of tannins at the 1994 Atlanta ICPS meeting, I was skeptical. Larry Mellichamp mentioned it as a key in getting the dark red forms of *Sarracenia alata* to get their characteristic black-red color. Since our clones always turned dark after the hot days of full summer sun, I assumed the pigment was related primarily to heat and sun levels. It wasn't until much later that I realized that the three factors were probably related.

My experiments began as an attempt to reverse possible calcium build up in *Nepenthes* growing media. After returning from a trip to Florida in Dec.-Jan. of 1996, I was alarmed at the yellow, weak condition of the plants and the higher than normal death rate of some rather hard to get seedlings. I sent numerous dying plants to the Plant Pathology lab at Virginia Polytechnic Institute; a puzzle faced us with their report of "no pathogens were found". My next guess was that the well had been slightly

contaminated with surface water and the pH of the media climbed with the introduction of calcium, (lime). Repotting the entire collection and propagative stock was a frightening thought. What if the media were drenched repeatedly with an acidic water? That should dissolve any solubles and restore an acid condition. I chose tannic and humic acids since *Nepenthes* must have a tolerance for these, given their habitat.

Peat moss and dried sphagnum were boiled for thirty minutes and strained to obtain a dark brown, pasteurized "tea". This was added to purified water, aerated and several test plants were given this brew twice a week. Slowly, over the course of a few weeks, the color began returning in the entire test sample. A yellow and dying *N. rajah* from tissue culture began to green up! Sphagnum started growing on the surface of the media. I started applying the peat "tea" to more plants until they were all getting it. Not only did they green up, growth increased, colors were brighter and pitcher size was rising surprisingly. This brew was giving results like a fertilizer without the fear of salt build up. Boiling doubtless released a complex mixture from the sphagnum and peat, rich in tannins, humic acids and polysaccharides. Seedling *Nepenthes* appear to survive better, probably due to the disinfecting quality of tannic acid and increased nutrient availability, at a lower pH.

Since I was making the "tea" anyway, I decided to test *Sarracenia flava* with it. For years, several clones that were deep red in the field were yellow-green with some veining in the nursery. These Florida plants grew in a depression surrounded by pine forest. The water filling the bog was hot and dark. Perhaps the hot summer sun was causing the tannins to dissolve at a high rate, making this race of *S .flava* red in Florida and seasonally darkening the *S. alata* in our nursery. Because commercial tea also is high in tannic acid, I also compared its effect on the same *S. flava* clone. All plants tested were genetically identical divisions from a single large plant. The plants were allowed to stabilize in containers for one year. All plants were yellow-green with some red veining.

After about three weeks, the plants getting the peat tea were noticeably more red than plants not getting the treatment. The plants getting commercial tea were also gaining red color, slowly but steadily. Ultimately, non-treated plants became the most pale. These were also not growing as quickly as those getting peat tea or commercial tea.

Keep in mind that these experiments are preliminary and may yield different results under different conditions. What exactly is happening has not been determined yet. Does the tea lower the pH so that nutrients become available for pigment and health? Do the tannins act as nutrients, becoming absorbed and metabolized into pigments and/or metabolic facilitators? Does the tea change the soil microorganism spectrum? I plan on conducting more experiments to determine the practical usage of tannic teas; my principal hope is that plant pathogens will be inhibited at low pH and high tannin levels while Nepenthes, Sarracenia and Dionaea seedlings will prosper. I am also trying tannic tea on Pinguicula planifolia, which is often difficult to maintain outside of its tannic habitat. So far, Cephalotus appears unaffected by peat tea and Heliamphora does not seem to respond to this treatment.

Here is the "recipe" I am currently using. Again, before using this, test a small sample under your conditions. Do not allow the brew to age; use it within a week and keep it cool. Make smaller batches if needed. I use a Coleman stove outdoors so my kitchen is not "soiled". Remember that acidic teas dissolve many metals! Use stainless steel or undamaged enameled vessels.

This is a concentrate which is added to water.

To 1 1/2 gallons of rain, distilled, or Reverse Osmosis treated water add:

One ball of dried sphagnum about the size of a grapefruit when slightly compressed in the hands.

One quart, slightly tamped, of new = unleached peat moss.

Yield is about one gallon. Boil these in a covered container for thirty to forty-five minutes, a slow simmer is fine. Allow to cool and settle for a while. Strain the particles out using nylon hosiery or other filter. Do not use paper filters as these clog quickly. Use clean, sanitized containers for transfer and storage. I strain the liquid while very hot into clean milk cartons. This way the container and brew are reasonably pasteurized. Because of the risk of burn, the beginner should wait until the tea is cool. There are tricks to effective straining which are best learned with cool tea. Keep the stream of tea being filtered to one side of the filter or nylon. If you pour too fast, the peat will form a cap on the filter and the brew will spill everywhere. Plastic containers are best for storage. Do not squeeze out the last bit by hand unless you are not worried about bacteria etc. washing off your hands and into the water! If your yield is much below one gallon, you may add slightly more water at the start of cooking. The pH of this concentrate, under our conditions, falls between 3.4-3.8.

I use 1-1 1/2 cup of this tea per gallon of water. A pH meter is handy for adjusting the ratio. The pH , as I've been using, should fall somewhere between 4.5-5.4. When watering, drench the media so water comes out the drain holes. Because this method adds chemicals, do not allow evaporation to concentrate, (over time), these chemicals in the soil. Drenching both adds and removes compounds. In nature, tannic waters are usually in motion, whether on the slopes of Mt.... Kinabalu or in the acid seeps of Florida. Adding air to the water/tea is probably smart; boiling or treatments usually remove oxygen from the water. Shake the cooled water in a partially-filled, clean jug or pump,(large scale), air into the treatment tank. Most CP benefit from aerated media. A weekly application is probably good to start your own experiments.

Freshly repotted plants probably won't benefit from this treatment; the media still has an acidic/tannic charge. Depending on watering habits, the media will eventually lose much of its acidity and this is when additional tannins, in the form of peat tea or possibly commercial tea, may hold promise for improving the health of carnivorous plants.

Currently, I am experimenting with tannic bark/ leaf mold/peat tea. The test concentrate is a pH of 3.4-3.8 and is being aerated and dripped over seedling Nepenthes. This very acid liquid may help protect the seedling from pathogens and nutrients present may be absorbed by leaves and/or roots. After three weeks, the test plants have not died or shown change. This test will probably run for 6-12 months before results will be noticeable, unless the test group dies!

Proceed with caution if you decide to experiment with tannic teas. Variables such as water quality, brand of peat or sphagnum and growing media will affect the performance of this method. My results are preliminary and based on our growing conditions. Begin with a limited test group before treating many plants. Compare treated and non-treated plants, preferably of the same clone. I would appreciate hearing from anyone having positive or negative results. Tannic teas may well be a useful technique in carnivorous plant culture.

The experimental growth trial for Royal Red VFT

by

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As part of the application process for Plant variety Rights (PVR), it is necessary to conduct a comparative growth trial. This trial is a scientific experiment to show whether or not the variety for which PVR is sought is distinct from all closest known varieties of "common knowledge". At the completion of the trial, the results are analysed, a standard description is prepared and, along with the final part of the application form, the application is submitted to the PVR Office.

In his article about the saga of *D. muscipula* Royal Red, (CPN Vol. 25(3), p.90), Colin Clayton made the following claim about the comparative growth trial that I